

AMENDMENT UNDER 37 CFR § 1.111
Application No. 09/903,476

REMARKS

Applicants respectfully request entry of this Amendment and reconsideration of this application as amended.

Summary of Status of Amendments and Office Action

As of the December 3, 2002, Notice of Allowability, claims 13 through 23 stood allowed as amended by the Examiner. Claims 1 through 4 stood withdrawn, and claims 5 through 12 and 24 stood canceled by an Examiner's amendment. In a March 3, 2003, amendment accompanying a Request for Continued Examination, Applicants amended claims 13 and 19, requested reinstatement of claims 5 through 12 and 24, and added claim 25. Claims 5 through 12 and 24 were not correctly renumbered in the amendment submitted on March 3, 2003, and were therefore not reinstated. Prior to entry of the present supplemental amendment, Applicants believe that claims 13 through 23 and 25 are pending. Claims 26 through 37 are being added through this supplemental amendment. As presently amended, claims 13 through 23 and 25 through 37 are presently pending, with claims 13, 19, and 27 being independent.

Newly Added and Amended Claims

Applicants wish to reinstate former claims 5 through 12 and 24, and since amendments are included, these are reflected as "new" claims rather than "reinstated." For the Examiner's convenience, Applicants note that "new" claim 26 corresponds to the previously cancelled claim 24, and "new" claims 27 through 34 correspond to the previously cancelled claims 5 through 12, respectively.

Applicants respectfully direct the Examiner's attention to the changes made to the former claim 5, which are believed to place this claim in a better condition for quick allowance. Claim 27 (former claim 5) has been changed to clarify the purpose of the treatment steps described therein by adding the impact of each step on catalyst activity and/or mono-selectivity. Support for these changes is found in the specification at page 13, Table and lines 6 through 10. Claim 27 also differs from former claim 5 in a

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clarification to the last reference to the catalyst, corresponding to the amendments made to claims 13 and 19 in the March 3, 2003, amendment.

Cancelled claims 6 through 11 have been reinstated as claims 28 through 33 without further amendment, but are also reflected as "new" since they depend from a "new" independent claim. Claim 34 corresponds to former claim 12 except that the temperature range has been corrected to correspond to that of claim 27.

Claim 25, added in the March 3, 2003, amendment, has been amended to properly reference the independent claim from which it depends as claim 27 rather than claim 5.

New claims 35 through 37 have been added as dependant claims under each of independent claims 13, 19, and 27, respectively, to reflect liquid phase alkylation conditions. These additions are supported by the text of the specification at page 3, lines 15 to 26.

Applicants submit that the claims are now in condition for allowance.

Response to the Prior Rejection of Claims 5 to 7 and 10 to 12 Under 35 U.S.C. § 102(b)

In the first Office Action, claims 5 to 7 and 10 to 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by Chu et al. (U.S. Patent No. 4,886,616). The Examiner stated that Chu et al. (abstract; col. 10, line 56 through col. 11, line 25; the examples, namely example 4) disclose a process of alkylation of an aromatic hydrocarbon, such as toluene, with an olefin, such as ethylene, in the presence of a molecular sieve catalyst, which, after a period of use, is regenerated with air and an aqueous medium containing acetic acid. The Examiner stated that the timing, temperature, and calcination of claim 5 could also be found in example 4 of Chu et al.

Applicants respectfully disagree with the Examiner's position.

The claimed process differs from that of Chu et al. in several important respects. First, in the claimed process, treatment with the aqueous medium is used to restore catalyst activity and/or mono-selectivity, whereas Chu et al. describe treatment with the acetic acid for the specific purpose of restoring para-selectivity to a catalyst modified by the addition of certain metal and/or phosphorous oxides. No such modifications are required for the present invention, and no restoration of para-selectivity is required in the

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present invention. In fact, a preferred embodiment of the present invention is directed to increasing mono-selectivity, an opposite effect from that desired by Chu et al. Claim 5 has been replaced by claim 27 which now recites the restoration of catalyst activity and/or mono-selectivity to clarify this difference between the inventions.

Second, in the claimed process, regeneration in an oxygen containing medium is a required step whereas Chu et al. only include an oxygen regeneration step in Example 4 as a negative comparative example. The purpose of contacting the alkylation catalyst of the present invention with an aqueous medium is to repair damage to the zeolite crystal resulting from the high temperature oxygen treatment step.

The Examiner has correctly noted that Example 4 of Chu et al. does use conventional air regeneration followed by the treatment claimed by Chu et al., but it is respectfully noted that this inclusion was for the apparent purpose of stressing that such prior regeneration was not necessary, and in fact was not desirable. Applicants note that the two-step comparison of Chu et al. resulted in reduced toluene conversion as well as slightly lower para-selectivity as compared to the treatment claimed by Chu et al with no air regeneration step. (Table II) Chu et al. note that "it is not necessary to burn the accumulated coke deposits from the zeolite to realize the benefit of the present invention." (col. 14, lines 30 to 34) Applicants respectfully submit that Chu et al. teach away from using an oxygen regeneration step prior to their treatment, and that their treatment is a treatment of different catalysts for a different purpose than the treatment of the present invention.

It is known in the art that para-selectivity of zeolites such as those preferred by Chu et al. can be enhanced by coating the surface with some material, including coke, to reduce the number of active surface sites and force the reactions to take place within the pore structure of the zeolite. The present invention is not limited to such shape selective considerations, and regeneration to restore activity to the surface sites is a desired result of the present invention. In fact, Table 1 on page 13 of the specification indicates that the present invention results in a reduction in para-selectivity for MCM-22.

It is further noted that the rejuvenation of Example 4 was carried out using acetic acid in air as opposed to an aqueous medium as described in the present invention.

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Based on the differences described above, Applicants submit that Chu et al. do not anticipate the process defined by former claims 5 to 7 and 10 to 12.

For the foregoing reasons, Applicants request that the Examiner withdraw the rejection and allow new claims 27 through 29 and 32 through 34, which correspond to cancelled claims 5 through 7 and 10 through 12.

Response to the Rejection of Claim 8 Under 35 U.S.C. § 103(a)

In the first Office Action, dated August 6, 2002, claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Chu et al. (U.S. Patent No. 4,886,616). The Examiner stated that Chu et al. are silent about using benzene as an aromatic reactant, but the Examiner considers the use of benzene obvious since it would be expected that any aromatic can be alkylated in the presence of the catalyst described by Chu et al. Further, the Examiner contended that toluene is a homologue of benzene and since toluene can be alkylated in the process of Chu et al., one would expect that benzene, a closely related homologue, could also be alkylated.

Applicants respectfully disagree with the Examiner's conclusion. As noted above, the Chu et al. patent does not anticipate the invention recited in claims 5 to 7 and 10 to 12. Since claim 8 depends from claim 5, the claimed process would not have been obvious. Nowhere do Chu et al. show or suggest the particular recitations in claim 5.

For the foregoing reasons, Applicants request that the Examiner withdraw this rejection and allow claim 30 which corresponds to former claim 8.

Response to the Rejection of Claim 9 Under 35 U.S.C. § 103(a)

In the Office Action, claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Chu et al. (U.S. Patent No. 4,886,616) alone or alternatively in view of Huss et al. (U.S. Patent No. 5,030,785).

Applicants submit that since Chu et al. do not disclose or suggest the process recited in claim 5, Chu et al. cannot suggest or disclose the process of dependent claim 9.

The Examiner acknowledged that Chu et al. do not disclose that the sieve is MCM-22. The Examiner directed attention to Chu et al., the abstract, stating that the

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zeolite has a constraint index of 1 to 12. The Examiner relied upon Huss et al., table, at column 5, lines 13 and 14 showing that MCM-22 has a constraint index of 1.5.

Applicants respectfully submit that the Examiner's position is not well taken. In this regard, the Examiner has relied upon a selected portion of the abstract which speaks of a constraint index. The abstract also states that the zeolite which can be treated in accordance with the Chu et al. invention must have a silica to alumina ratio of at least 12 and have a minor proportion of the oxide form of one or more chemical elements (e.g. phosphorous and magnesium) deposited thereon. The Examiner, however, has not shown that MCM-22 has the other properties so that it can be used in the Chu et al. invention. In this regard, the Examiner's attention is directed to Chu et al., column 5, lines 42 to 45, which discloses the zeolites useful in the Chu et al. invention and to Chu et al., column 6, lines 19 to 42, which list zeolites which are not useful in his invention and zeolites which are useful in his invention. It is again noted that Table 1 on page 13 of the specification indicates that the present invention results in a reduction in para-selectivity for MCM-22.

For the foregoing reasons, Applicants request that the Examiner withdraw this rejection and allow claim 31 which corresponds to former claim 9.

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CONCLUSION

For the reasons advanced above, Applicants respectfully submit that all pending claims patentably define Applicants' invention. Allowance of the application is therefore respectfully requested.

Should the Examiner have any further comments or questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,

Date 5/8/03



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